

# POPULAR **Computing** WEEKLY

22 July 1982 Vol 1 No 16

**35p**

**Voyager on BBC**

**Spectrum character  
designer**

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### Accuracy

Popular Computing Weekly cannot accept any  
responsibility for any errors in programs or  
opinion, although we will endeavour to take  
steps to make sure programs work.

## This Week



Two worlds in one type

**News** 5  
Yet another new micro

**Letters** 7  
VLSI, program instability

**Page** 8  
*A game for the 680C micro made by  
Jeremy Rusk*

**Spectrum** 10  
Character designer by Jeremy Rusk

**Street Life** 11  
David Kelly reports on computer  
holidays

**Reviews** 12  
Seymour, Alan Gelfand

**Open Forum** 16  
Five and a half pages of your programs

**Award Scheme** 21  
The fourth week of our competition  
win a ZX Spectrum

**Programming** 22  
Upper lower case letters

**Puzz & pots** 26  
Your questions answered

**Extras** 28  
Custom

## Editorial

The microcomputer market is starting to  
hot up. The future surrounding the  
launch of Sinclair's ZX Spectrum had  
hardly begun to die down before two  
new microcomputers appeared on the  
scene.

The Dragon 32 and the 128 Sim-  
mons micro will both challenge Sin-  
clair's dominance of the home com-  
puter market. In addition, Acorn's Geo-  
metron and Commodore's new range of  
Vics are lurking in the background.

Even established manufacturers,  
such as Texas Instruments and Atari,  
have been forced to cut their prices.  
The Atari 400 and the 1300XE are  
now selling for less than £200, a drop  
of more than £150 in each case.

Increased competition among micro-  
manufacturers can only be of benefit  
to the user.

Companies will no longer be able to  
ignore delivery dates with impunity. If  
a promised micro is not delivered  
within 30 days, the customer will  
simply cancel his order and buy  
another micro off the shelf.

## Next Week



Take charge of a nuclear  
power station as it threatens  
to blow up. Can you prevent the  
Mell Dwell? — A new game for VICE



## £100 Oric 1 to be launched in October

TANGENT has completed design work on a new machine which will go on sale in October for less than £100.

The Cambridge company has produced the machine under contract for Oric, a high-technology investment company.

The machine will be known as the Oric 1 and will be based around the 6502 microprocessor with video RAM, or VRAM.

Using extended Macintosh Basic, the machine will offer eight colours, three-channel sound and a 40 x 34 display.

Special features include a resolution 380 x 240 graphics, preprogrammed word processing

module and a 256 colour line for system status reports. The Oric 1 uses the video cassette operating system on the Macintosh and the ZX Spectrum, operating at 1280 or 2560 lines.

The first working prototype has been built. Most of the hardware and software has been produced and Tangent are now only await delivery of the Oric 1.

Orders for the Oric 1 will be accepted from October 1, available by mail-order only, direct from Tangent.

The 100 Oric 1 will be competitively priced at less than £90 and 190. The 480 version will cost about £140.

## Defence prompts £30m investment

THE Ministry of Defence's electronics research centre wants to invest more than £30m to compete with the US in producing Very High Speed Integrated Circuits.

The MoD needs the UK project to develop high-speed system gateways system. It is likely that any such initiative would be linked to a parallel industrial scheme.



Oliver Butler... for Spectrum 2000 in 2000 lines

## Spectrum joins the classroom revolution

THE ZX Spectrum has been officially approved for use in schools.

The search for suitable micro follows the commission of the Government's education scheme for microcomputing in education.

This plan allows half the cost of every school bought for use in a school to be met by the state.

The scheme, originally only applicable to secondary schools, has been so successful that it has now been

extended to include primary education.

The campaign is backed by the Industry Department and is not subject to the normal education budget.

Industry Secretary, Patrick Jenkin, has been reported as saying that he has received favourable indications as to the cost effectiveness of the Scheme machine.

The ZX Spectrum now joins the BBC, Acorn and Research Machines 1000 as an officially approved micro.

## Agreement on networking

TWENTY companies, including ICL, have agreed to adopt standards on networking.

The guidelines are in line with those suggested by the European Computer Manufacturers Association. The standards apply to open system local area networks.

The companies involved include, in addition to ICL, Xerox, DEC, Fujitsu, Intel and Siemens.

Equipment manufactured by companies adopting the standards will be easily interchangeable to give users an open system local area network.

The standards adopted by ECMA are broadly compatible with the European networking system. It should be already being developed by Xerox, DEC and Intel.

## Holiday break

PRODUCTION of the British Spectrum has been halted for the annual three-week holiday at the Tinson factory in Dunstable. It will restart on August 5.



The Glencorl Irvine Plant has been designed by Robert Rogers and Perkins, the same high-tech/academic who produced the controversial Pininfarina Centre in Paris.

## Dynamic future for Welsh chip industry

IMAGIS, the Government-financed UK chip manufacturer, has produced the first of its new 168 D-Ram devices.

It is the third dynamic Random Access Memory (RAM) device that Imagen has produced. They are the latest chips of their type and available with an access time of 100 nanoseconds.

Imagen is backed by nearly £100m of British Technology Group (formerly National Enterprise Board) money.

Although the company announced a £1.2m loss last year and may well need further aid

to cover development costs, Imagen now supplies over 80 per cent of the world market for 168 static RAMs.

The world market for 168 D-Rams is estimated to reach \$100m this year and is expected to rise to high as £200m by 1991.

Two models are currently being produced by the plant. Production of the 168 chip will begin in the end of the year and that of the 168 D-Ram will follow shortly thereafter.

The factory will initially provide 200 new jobs.

## Gloom over silicon valley

NATIONAL Semiconductor, the California-based silicon chip manufacturer, has reported a substantial loss for the financial year to May 31.

The deficit of \$1.6m compares with a dramatic drop when compared with the company's previous year profits of \$24m.

These results — the worst reported by the semiconductor industry — result from a general decline in the 175-pin market. The reasons have been caused by increasing competition from Japanese companies and by a slump in world demand.

In line with a recent system in trading conditions, National expects an improvement in the 1981-82 fourth quarter turnover. There is hope that the trend will continue.

## Sharp response

SHARP reacted quickly to news reports that it is to produce a colour microcomputer for under £100.

A spokeswoman commented "it's soon to go".

# DOWNSWAY

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Without trade-in, the Downway 48K Memory costs just £59.95 plus £2 p.h. — still incredible value!

The 48K Memory gives 48K of available memory, and simply plugs into the 2 1/2" without needing an additional power supply, or adding any extra load to the internal 5V regulator.

(Should you only need 16K of memory for your ZX81, the Downway 16K RAM Pack offers the same benefits at high standards and low price at only £24.95 plus £2 p.h.)

Finally, "low-profile" styling of both memories complements the ZX81 and a special heat radiation provides added mechanical stability.



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## Hours of entertainment

- **Lunar Landing.** Control the angle of descent and jet thrust to steer the lunar module to a safe landing on the moon's surface.
- **Maze.** Find your way out from the centre of a random maze.
- **Android Min.** Play the Spectrum at the ancient games of Min using creatures from outer space.
- **Blackthorn.** Plot the cycles of your emotional, intellectual and physical activity. Some would say this is not a game at all.

## Improve your mind

- **Mouse.** A complete mouse-code training kit. This program will take a complete beginner to R.A.S. proficiency.
- **Maths.** Adjustable to various levels, this program is an invaluable aid to anyone trying to improve their arithmetic.

## Run your life more efficiently

- **House Accounts.** Keeping track of your finances with this easy-to-use program will enable you to see at a glance where the money goes and plan your spending more effectively.
- **Telephone Address Pad.** Instant access to many pages of information.
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COVER STORY

# Voyager

A new game for BBC model B  
by Jeremy Russell

Voyager 14 is a development of the Voyager mission launched by NASA in the 1970s.

The first Voyager space craft flew past Saturn in November last year, sending back some breath-taking pictures of the ringed planet. Voyager 1 is now heading out of the solar system at 48,000 miles an hour. Voyager 2 is en route for Uranus where it is due to arrive in 1986.

In Voyager 14, you are a NASA mission control responsible for the latest unmanned Voyager probe. Your mission is to shepherd the Voyager on Jupiter, the red giant. But, watch out for Jupiter's massive gravitational pull.

Once you have successfully landed on Jupiter, you can attempt to send on Saturn.

This game is for the BBC model B only, since it uses BBC Plot and graphics. It is set in Mode 1.

To start the game, type Plot. The screen will fill with stars and the two planets, Jupiter and Saturn, will appear. Information about your current interstellar co-ordinates and velocity will be printed in the text window.

The first stage of your mission is to choose a launching pad. Use the cursor left and right keys to position the Voyager at the bottom of the screen. Press Copy when you are ready to launch the probe.

This sets off Voyager's velocity in any direction by pressing the cursor keys. But, if you get too fast, Voyager will go into orbit and you will lose all control over her.

When you approach either Jupiter or

Saturn, you will have to reduce speed or Voyager will break-up on impact. If Voyager is travelling at the correct speed, she will land in one piece.

All the planets are constantly in motion, they will be in different positions on the screen each time you play the game.

Lines 50-60 initialise the screen and set up the program variables. Lines 115-130 update Voyager's co-ordinates while line 140-170 handle the end of the game. Line 220 starts the definition of Plotmode, line 230 removes the cursor and lines 260-270 set the graphics and text windows.

The co-ordinates of the two planets are chosen in lines 340-370 while their masses and that of Voyager are set in lines 380-400. The planets are plotted in lines 410-440 using Plotmode.

The definition of Plotmode velocity is set in line 460 while lines 460-510 give the layout in the right mode. Voyager's co-ordinates are set in lines 720-740. Lines 780-810 allow you to move the ship to her starting position.

Line 940 sets up channel 0 for white noise while line 1060 creates the sound effects. Line 970 starts the definition of Plotmode co-ordinates. The ship's velocity is controlled in lines 1080-1090.

Voyager's new co-ordinates are calculated in lines 1180-1190. Line 1190 draws a line to the ship's new position. Line 1200 updates the interstellar co-ordinates display and lines 1210-1220 display the new velocity.





[illegible][illegible][illegible]

# Spectrum

## Another bunch of characters on the menu

Jeremy Hall presents a simple program for creating graphics characters on an 8 x 8 grid.

This program is called Character Designer and allows you to take full advantage of the user definable graphics facilities of the Spectrum.

When Run, the program presents you with a menu of options. To design your character type in the letter C. This will save you with an 8 x 8 grid and the

prompt "Line?" Type the line number (0 returns you to menu) and enter it. The prompt now asks "Character", to which you reply with another number.

A third prompt asks "Plot or erase?". Typing P will fill in the grid while typing E will erase it. When you are happy with the design, type Q after the "Line?" prompt to return you to the menu.

Having designed the character, Type C. You will be asked which user definable graphics letter you want to replace the new character. Typing any letter between a and z will gain the process. After a couple of seconds your new character appears.

Next, press any letter to return to the menu. Type Q again to design more characters. Type R to print all of the 25

user definable graphics, as they stand.

Returning to the menu, entering R, V or L will show you in Base, Hex and Line your new character set. Only the characters will be saved, not the whole program.

The Design part of the program appears to be a reasonable piece of graph paper. However, if you examine line 70 you will see that the plot status is stored in R(0,0). This is used in the creation of the character in line 340. The C key reads user graphics the L key increments the line, Z stores the decimal values to be joined into the graphics character in lines 300-330.

The rest of the program is self-explanatory. If you should accidentally stop the program, typing Goto 1000 as a saved command will take you back to the menu.

```

100 REM ***** CHARACTER DESIGNER *****
110 REM *****
120 REM *****
130 REM *****
140 REM *****
150 REM *****
160 REM *****
170 REM *****
180 REM *****
190 REM *****
200 REM *****
210 REM *****
220 REM *****
230 REM *****
240 REM *****
250 REM *****
260 REM *****
270 REM *****
280 REM *****
290 REM *****
300 REM *****
310 REM *****
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340 REM *****
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430 REM *****
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810 REM *****
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830 REM *****
840 REM *****
850 REM *****
860 REM *****
870 REM *****
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890 REM *****
900 REM *****
910 REM *****
920 REM *****
930 REM *****
940 REM *****
950 REM *****
960 REM *****
970 REM *****
980 REM *****
990 REM *****

```

```

1000 REM *****
1010 REM *****
1020 REM *****
1030 REM *****
1040 REM *****
1050 REM *****
1060 REM *****
1070 REM *****
1080 REM *****
1090 REM *****
1100 REM *****
1110 REM *****
1120 REM *****
1130 REM *****
1140 REM *****
1150 REM *****
1160 REM *****
1170 REM *****
1180 REM *****
1190 REM *****
1200 REM *****
1210 REM *****
1220 REM *****
1230 REM *****
1240 REM *****
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1280 REM *****
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1470 REM *****
1480 REM *****
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1500 REM *****
1510 REM *****
1520 REM *****
1530 REM *****
1540 REM *****
1550 REM *****
1560 REM *****
1570 REM *****
1580 REM *****
1590 REM *****
1600 REM *****
1610 REM *****
1620 REM *****
1630 REM *****
1640 REM *****
1650 REM *****
1660 REM *****
1670 REM *****
1680 REM *****
1690 REM *****
1700 REM *****
1710 REM *****
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1810 REM *****
1820 REM *****
1830 REM *****
1840 REM *****
1850 REM *****
1860 REM *****
1870 REM *****
1880 REM *****
1890 REM *****
1900 REM *****
1910 REM *****
1920 REM *****
1930 REM *****
1940 REM *****
1950 REM *****
1960 REM *****
1970 REM *****
1980 REM *****
1990 REM *****

```

# Street Life

## Go camping ... with a computer!

David Kelly looks at a new  
concept in leisure activities—  
computer holidays.

Summertime. Take a break. Vapouring in the sun. How about a computer holiday?

The Computer Camps is the brainchild of Stewart Wiley, founder of Resumons Summer Camps. This year 6000 young adults will spend a week, or two in their summer camps. Children aged 11 to 17 will spend half their holiday learning to use and program macros and the rest of their time learning any of 28 other activities, from archery to woodcraft to nature fishing.

According to Stewart "the kids will have an exciting day, every day."

The concept of the summer camp is not a new one. The summer camps after is a deep-rooted part of the American way of life. Because of the lengthy summer vacation keeping the kids occupied became a real problem. Summer camps in the US provide almost essential relief for parents. It is only recently that the idea has been tried out in this country, with much success.

Resumons Summer Camps are prominent in this field in the UK. Stewart Wiley has been involved with the leisure business for 18 years. Originally working in the tour industry, market his claims to have "put Camps on the map".

He gave an interview on 155 to with Dennis Bailey, who has headed the state of computer holidays.

The Resumons Computer Camp was the outcome. Wiley and Bailey got together in January 1981 and last year the first holidaygoers attended summer camp.

Following the success of the 1981 season, Resumons now offer two camps including a residential one in the Lake District.

Stewart Wiley is the man who organises the computer vacation at Tollymore Park, just outside Cardiff. He explained that between 1980 and 1981 each week will be able to learn or improve their programming. Each person gets their own computer — it is the central feature — doing their computing day. There are two four sessions per day where a variety of skills are explained. There are introductory courses on Pascal with helping in machine code and assembly languages for the more advanced user.

The camp will have 32 ZX81's and 50 ZX



Summer camp founder Stewart Wiley

Spectrums in use. Anyone wishing to learn Pascal can do so, or use a file 4000.

As Wiley explains, "Nothing is forced on them — the motivation for learning comes from the kids themselves."

He is a believer in a North London programme and is very keen that the kids should learn as well as having a good time, he says. "It is not a competitive environment. Everyone has their computer and they learn at their own speed."

"Last year was the first year. We were worried the novelty of computers would wear off during the week. Instead we had great difficulty in separating them from the camp."

"Twelve 12 and 13-year-olds writing the sort of programs by first year degree students are asked to produce. I'm sure

this is because they have real motivation and more imagination. They don't know what is expected of them — more importantly, they don't know what they are not expected to be able to do."

The Tollymore Hill camp employs about 18 people to support the computer courses so that the participants can be 1:1. Most of the help is provided by Peter to make sure they are able to provide tuition at the right level.

Whether or not the camps will appeal to you rather depends on whether you like the idea of a "structured yet informal programme" of education and adventure.

The other camping factor may be the cost. Full board and accommodation at the adventure camp costs £115 per person per week, plus a £25 supplement for the computer camp option. A two-week stay is recommended.

The Computer Camps are proving to be very popular this year, although there are still some places remaining unbooked.

That success has caused Resumons Summer Camps to plan further expansion. Later this year they are planning to host winter holidays for organised official school parties.

For further information and a free colour brochure write to: Resumons Summer Camps, 100 New Kings Road, London SW6 1PL Tel: 01-870 2070

## What's happening

**MS-Basic News** is a bi-monthly news magazine for Microsoft and Commodore. Details from Interface Data, Oxford Circle, Sylamore Road, Birmingham, B44 8JL.

**South Herts Computer Club** meets every week at the 40, Hangers Hall, Haring Street West, Stevenage. A wide range of events are recommended at the monthly which start at 7 pm. Contact Brian Clark, 40 Haring Street West, Stevenage, Suffolk. Tel: 0207 52611 or 0207 63064.

**6000 Users Group Newsletter** is an information exchange for 6000-100-50 users. Contact T K Boyd, Marlborough School, Farnham, Wokingham, Surrey. Tel: 0409 271700.

**The Computer Users Club** has just been formed. The club will provide a monthly newsletter containing news, tips, tips, programs, articles and reviews of use to many enthusiasts in the Club. Contact Murray Simpson, 31 Torr Street Lane, St Andrews, Fife.

**Cardiff 101 Club** provides advice and a software loan for 101 users. Contact Mike Hayes, 14 Calvey Place, Grange Park, Cardiff. Tel: 0222 271700.

## We want to hear from you!

Whether you are starting a new club, holding a special meeting, or just changing the format, we want to hear from you.

Write to David Kelly, Club News, Popular Computing Monthly, Hallowood Court, 18 Whitcombe Street, London WC2 2HF or call him on 01-830 9271.

# Reviews

## software

### Atom Galaxies

Diagram: 48-100 The Atari's 100 best games played upon 48-bit and 48 graphics, cassette Price: \$9.95

OUCH! That seems to be a high price to pay for a single Atom program. But, if you're spending several evenings a week playing it at home late, you'll get your money back soon enough.

For this is a typical bug-byte implementation of a planetary sciences arcade game. You are probably aware of it already. It is basically *Invaders*, but this time ships from the approaching enemy pass out bullets you end by scoring if you get off the face of the Earth. "The world you" is ideally true — these ships are programmed to rise and descend, and then explode within a couple of seconds if your fingers stop off the keys. There are no shields to push under — your only protection is to shoot the attackers or to flip out of the way and let them crash. Reprogramming follow of course is immediately on and all the time the points are falling.

Although I try to avoid computer games, as there are solutions, I must admit to missing all of bug-byte's pleasures on occasion limited of nothing. *Galaxies* is not much more a temptation as it is that much more difficult. There are only three controls (left, right, fire), but my standard way of surviving at *Invaders* — continuously firing — is not allowed this time. Tough, tough, tough.

The bug-byte *Galaxies* is fast. There is no shock or awe, but it may be that succeeding comes with ease — I don't believe so. It's not yet gotten the friendly and bug-byte's standard no instructions. The programming is good, with well designed ships and excellent sound effects. The screen includes a continuous display of current score, highest score and number of lives left. But when you're off the face of the Earth, you go right back to the life home. Kinda fun, bug-byte? It's really annoying.

#### Summary

Get your teeth and pay for this superb arcade game for the Atom world. It's got to be the best of the genre. **A+**

### Skymath

Diagram: 48-100 The Atari's 100 best games played upon 48-bit and 48 graphics, cassette Price: \$9.95

Skymath is supposed to be the fun way for children to learn addition and subtraction of decimal numbers. The tape and the packaging are of a high professional qual-

ity. The cassette flysheet has a full set of instructions printed on the inside.

Control shows why a simple addition and subtraction program should require a jet nation's expenditure. Even with the 48-bit graphics and sound, it should have been possible to write a program to be the best of its. This cassette is thus limited to those who can use what the over-price expenditure pays.

Once you have chosen whether to use for the addition or subtraction test, the display presents a series of green-ragged numbers with color patterns at each side to form the numbers. These red numbers are the numbers you and large yellow numbers appear on the screen.

The first example was 43.00 minus 23.00. I typed in 7 and a thin red line appeared from the left-hand side of the screen to the point where the 7 appeared. It was accompanied by noise. If you get the whole number correct, there is a brief burst of sound and the answer displays itself by itself into the left below the whole process starts over again.

If you make a mistake a small white flying saucer appears at the left of the screen and shoots the whole number.

A small counter at the bottom of the screen tells you how many questions have been answered correctly.

If you want to change from addition to subtraction that way through you cannot. You have to break the program and start again. In other words you risk the sound of the number of correct answers.

#### Summary

The large numbers are poorly designed — many of them are barely recognizable as normal numbers.

At \$9.95 and a memory expenditure pack the program is too expensive. **B-**

### Nowebnik

Diagram: 48-100 The Atari's 100 best games played upon 48-bit and 48 graphics, cassette Price: \$9.95

This cassette contains three different games — the Nowebnik Puzzle, pictured below, *Demolition* and *Targit*.

The Nowebnik Puzzle is rather like a mathematical Rubik Cube. The Puzzle starts by displaying a square which is divided into four smaller, differently shaped, squares. Depending on the level of difficulty chosen, these squares are then broken up into a number of smaller squares.

The object of the game is to move the squares around the screen until they match the original pattern. The program records the number of moves taken to complete the puzzle.

As an aid to the player, a miniature version of the original pattern is displayed in the top left-hand corner of the screen.

The instructions to the puzzle are excellent. The player is led through a series of examples which demonstrate the different features incorporated within the program.

#### Summary

Only two out of three cassettes in this set of the puzzle. Firstly, it is not easy to beat, because of the low recording level. Secondly, the miniature version of the puzzle displayed in the top left-hand corner of the screen is too small to read easily.

The two remaining games are less interesting than the Nowebnik puzzle. *Demolition* is an unsatisfactory mixture of *Space Invaders* while *Targit* provides a reasonable situation of her got taking. **B-**



# Reviews

## hardware

### Telesound 82

CompuSound, 32 Langley Close, Red Cross, Woking 186 5127 (1400)  
Price £9.95

The Telesound 82 unit, designed for the ZX81, is fully compatible with the ZX Spectrum. The unit is available from CompuSound, and was released in PCW June 84.

According to CompuSound's Frank Woodcock, when the unit is fitted to the unit socket it "turns the Spectrum's 1600 into a mixer". The add-on also enhances the video, producing what a lay is depressed on the two lines — a facility of use when using in programs.

Since the Telesound 82 plugs into the unit socket, there is still room to plug a cassette player into the unit socket. This allows the Spectrum to function like with a major type of your choice. **OK**

### Quickaltra 3K add-on

Quikaltra, 80 Upperdownhill Road, Southampton  
Price £10.00

The 3K add-on gives ZX81 or ZX81 users extra Ram at low cost. The 3K add-on to the Ram the ZX81 already has provides a total of 4K.

Made up of six 5114 party Ram chips, the board has no problem of whatever due to Spectrum Ram. It is also fully immune to heat as it is mounted on a printed-circuit board at the back of the computer using a lighter version of the 50-way edge connector.

Since the board stands upright behind the computer and has no edge connector at the back, if anything other than the printer it is connected up to the computer, such a connector has to be fitted or a connector has to be provided.

This extra Ram provides enough memory for the ZX81 to recognise sophisticated on-screen text that it can provide a full screen. This means that programs which need a full screen to work, but not a full 16K of Ram, can be made to run without modification on this Ram board.

It is extremely easy to use, as there is no heat or fan-blade noise causing errors during programs.

Two programs are also available from Quikaltra that only require 4K of Ram to provide some interesting arcade games. The games are '65 Astronoid and '65 Defender. Both are very quick because they are totally written in machine code. They illustrate very well just what can be done with a maximum of Ram.

It requires Quikaltra can supply a

motherboard in £10 together with an edge connector at £4. This will leave you with two-card-sockets which can contain either a sound board with three channels or a character board which can provide 108 separately programmable characters for your programs. **6.5**

### Explore Computing

By William and Jeannette Andrew, publisher to Howard Books, 281 pages  
ISBN 0 356 13331  
Price £8.95

This is an American text for the TRS-80, but perhaps surprisingly, the book is not only in a well written and pleasing in many ways.

The TRS-80 book was, written long ago, one of the most popular manuals for home and school use. It is still going well if overshadowed by the new books. It has a number of typing features as well as a conventional version of text.

The latter feature makes this book potentially of wider interest than just to Tandy users.

The Andrews have provided an extremely good introduction to mathematical computing. The book comes from a series of courses on mathematics for teachers in Oklahoma.

The Andrews go meticulously deeper into mathematics with a more than any other authors I know. If you like mathematics, you'll love this book, even if you're a ZX81 or Apple user. There are plenty of examples and exercises for you to develop yourself. The whole is put over with enthusiasm and new understanding.

That new understanding does not extend to the non-mathematical TRS-80 user. CharlesCove are not dealt with until half way through the book. There are few games and asking any going-forward are covered almost as afterthoughts.

Read up on non-mathematical TRS-80 users, but great news for devotees of the queen of sciences. **6.5**

### Conclusion

The authors have tried to provide a good introduction for the novice Tandy user. However, they have written a very useful book on mathematical computing. **6.5**

### 56K Ram Pack

Overway Electronics (UK) Ltd, Overway House, Square Road, Jarrow, County  
Price £60.00 if a 16K Ram pack is sent with order the price is reduced to £49.95.

Overway Electronics has been selling 16K Ram packs for some time now but only through agents. Their units were recognised as they were the only ones that came in a black 276 x 176 x 1 inch plastic box.

The new unit replacing 16K of Ram (only 16K is available) is set in the same case. The unit is very small and fits perfectly with the style of the ZX81. The edge connector is a very light fit and Overway provides a flash wire to stick above the expansion port on the ZX81 so that no Ram-pack module can cover like the Senior Ram pack. However, once fitted on the back of the ZX81 the expansion port is covered up. Any printer or cassette has to be fitted between the computer and the Ram pack.

The unit is very well made and, unlike Senior's Ram pack, it does not "heat", even though it is plugged in the same way direct from the ZX81.

Only 16K is available since the 5600K 8K (2 to 8K) in the memory map has to be kept clear for the Rom. The rest of the memory map is filled with Ram, leaving no space for any memory-mapped peripherals.

However, it provides the 16K program area with 16K for the programs plus 3K of memory for machine code, data etc.

The 16K Ram type is set in 16K in the memory map is not recognised by Senior's board and as it is unaffected by the command New, Run, Load, Save and Clear. The only way to destroy information stored in this section is to turn off the power.

Of the 16K available, only 16K can be used for writing a program and the screen display. This is because of the way the machine is built. Consequently no machine code can be run in the section above the maximum one and, therefore, only machine code can be run in this section. This limit is very rarely reached so it is usually the variables which take up the space.

The instructions that come with the Ram pack are very clear including the above provisions and a guarantee.

### Summary

A very worthwhile addition to any ZX81 as it is cheap, light and easy to use, giving the programmer maximum use of the 5600K. **5.5**

**NEXT WEEK** we review Savin Hardware's impressive 256K module, plus the same company's keyboard repair and the book: Your Ram Computer by Michael Hayes and Michael Forbes.





# Open Forum

Open Forum is for you to publish your programs and ideas.

It is important that your programs are bug free before you send them in. We cannot spot all of them. Contributions should be sent to: Popular Computing Weekly, Hatherow Court, 19 Willesden Street, London W4 2JF 7NF.

## How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for 500W4.8 discount fee we pay for published programs.  
(The usual fee is £750.)

### Preparation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed rather than on a computer screen. The documentation should start with a general description of the program and then give some detail of how the program has been constructed and its special features.

Listings taken from a ZX Printer should be set out in convenient lengths and carefully check them on to white paper, avoiding any wrapping.

Please enclose a stamped, self-addressed envelope.

## Wild Spectra

### on Spectra

The game is written for a 128 ZX Spectrum. It is aimed at defining the on board on the right hand side of the screen from the invaders who are walking along the edge from the left.

Each invader will walk from its starting position to the far right of the screen unless you shoot it. You do this by moving on to the path it is coming along and then pressing the "1" key.

Sometimes pressing the "0" key is more often used. The game ends when all six lanes are occupied by the invaders. Four score is then given — one point for each alien slumped minus two for each one that gets through.

The letter "I" will be shown in a capital letter every time the invaders look in or before turning the program. The first set of invaders in the 80 should contain a space, a greater "0" and a greater "0". The second

to next page

## Wild Spectra by Giff Langley

PROGRAM OF THE WEEK

```

1000 REM THE WILD SPECTRA
1001 REM G. Giff Langley 1980
1002 REM
1003 REM 128K SPECTRA
1004 REM 128K SPECTRA
1005 REM 128K SPECTRA
1006 REM 128K SPECTRA
1007 REM 128K SPECTRA
1008 REM 128K SPECTRA
1009 REM 128K SPECTRA
1010 REM 128K SPECTRA
1011 REM 128K SPECTRA
1012 REM 128K SPECTRA
1013 REM 128K SPECTRA
1014 REM 128K SPECTRA
1015 REM 128K SPECTRA
1016 REM 128K SPECTRA
1017 REM 128K SPECTRA
1018 REM 128K SPECTRA
1019 REM 128K SPECTRA
1020 REM 128K SPECTRA
1021 REM 128K SPECTRA
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1195 REM 128K SPECTRA
1196 REM 128K SPECTRA
1197 REM 128K SPECTRA
1198 REM 128K SPECTRA
1199 REM 128K SPECTRA
1200 REM 128K SPECTRA

```



## Open Forum

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

net contains a space, a graphic "T" and a graphic "U". The first contains a space and a graphic "T", the fourth a space and a graphic "U". These are changed by the program into the numbers and the error calculation can be done.

The culture used in the game may be more shocking to you, I don't quit, as I only have a black and white TV. I just tried to change the language commands. Good luck you'll need it. My highest score is 2000. No one else. All you have to do is practice. lol

5. *Journal of the American Medical Association*, 2000; 283: 2686-2692.

100

The key is using 32 or 64-bit more accurate the stars are using. The game for the standard 1000 inches testing the stars is 100. It takes enough memory to contain the number of stars falling through red, respectively, enough for user-defined precision.

The bank is made from A.B.B. aluminum. Customers may 840-6640. The color-coded doors are of clear acrylic, and control is either red or silver + red, as shown above.

If required you could convert to unsigned quite easily with the following code:  
 #include <stdint.h>  
 ...  
 int P = 0x1122; // the 16-bit P=1122 instead of  
 P=23 and the 16-bit 143 and 180 instead of  
 1798 and P=184

[illegible]

100

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

One of the most attractive and widely advertised features of the video library has been its ability to run the vast library of 2700 50 Lines 5 collators in most cases in Indian has had the 1/3 screen roll experience no trouble at all in this regard, but there is one area in which they may find "easy" programs as not absolutely useful and this is when the use of a computer is involved.

Microsoft's new programs, such as Microsoft's **INTERNET**, do operate the prior policy, so you should always check the language carefully before turning the program.

However, over the other years of the sustained FDI increase, spending that has increased much less continues to be sold in

**Figure 6**

100

1000

[illegible]

# Open Forum

## from previous page

perform as expected and disassembling it in debug when very often a few slight changes will make the program work the other way round.

With Basic programs, the program usually starts through a mapsize to find out that the printer actually is on line before printing data to be output to it. Now the 7405-80 uses memory-mapping ... that is, it sends a then address 144012 or 270000 which corresponds with the printer. It is as if there were "PRINT PRINTER 144012" means 270000. It is a properly connected and switched on, then PRINTER 144012 = 0.

The Y80, however, commands to the printer through Port 100 0104, and not through the memory address, so that "PRINT PRINTER 10000" substituted for the Tandy machine and sent out the program with success.

In the typical case of machine-code programs, however, the matter is a little more complex. I was myself, for instance, rather disappointed in a recent purchase of the Oak Commodore 6400. Not only did it output to tape in a non-standard format and incorporate provisions which made it difficult to examine, but it couldn't do printer I/O (printer was quite capable to the video device).

It was necessary first of all to locate

those parts of the program which made use of the memory mapped address. This involved patiently stepping a byte at a time through bits of machine code with 2 flag in search of calls to 1000H, and then using 01545 to disassemble that in the appropriate sections of code. Twelve addresses requiring modification were finally identified.

ADDRESS	ADDRESS	HEX	HEX	HEX
00000000	00000000	04	00	00
00000001	00000001	13	00	00
00000002	00000002	00	00	00
00000003	00000003	00	00	00
00000004	00000004	13	00	00
00000005	00000005	00	00	00
00000006	00000006	00	00	00
00000007	00000007	00	00	00
00000008	00000008	00	00	00
00000009	00000009	00	00	00
0000000A	0000000A	00	00	00
0000000B	0000000B	00	00	00
0000000C	0000000C	00	00	00
0000000D	0000000D	00	00	00
0000000E	0000000E	00	00	00
0000000F	0000000F	00	00	00

For the first address, using the monitor, 00000000 was changed to 00. It would have been done from Basic with the command POKE 00000000 0. The other 11 addresses were similarly dealt with, and in no time at all disassembled hex data was being built into the printer.

But it was obviously going to be too tedious to poke in 12 bytes every time I wanted hex data from 00000000, so a new step was to put together a program in machine-code routine that would do the job auto-

matically. It was deemed to save immediately after 00000000 and run before storing into disassembled code which would otherwise be lost. No matter where Pokes is located in memory, since it is a variable size it has done its job.

The procedure can be followed for any TMS software which uses the I/O routine pointer to Tandy.

## Colour Coding

### in BBC Micro

The previous program will, in mode 1, assign control characters to the location held so that the colour changes and/or colour graphics can be entered directly into print statements.

Subsequent characters will then appear in the selected colour as they are entered and whenever the program is done it runs. This will only work once but gives immediate visual confirmation of the selected colour or graphics character used.

To directly enter graphics you key it in immediate mode or run a new line program which gives suitable control codes into the buffer. These codes will then appear in a print statement once one of key 0 or key 1 has been used, whatever is

to next page

7400	210040	00100	ONE	LD HL, 4000H	:GET 1ST ADDRESS TO CHANGE
7401	3000	00110		LD A, 000H	:IN A, (000H)
7402	000174	00120		CALL SUB	:POKE ALL 3 ADDRESSES
7403	210440	00130	TWO	LD HL, 4004H	:OUT (4004H), A
7404	3000	00140		LD A, 000H	:1ST BYTE TO POKE
7405	000174	00150		CALL SUB	:NEXT 3
7406	210040	00160	THREE	LD HL, 4003H	:ADDRESS SECTION 03
7407	3000	00170		LD A, 000H	:1ST BYTE
7408	000174	00180		CALL SUB	:NEXT 3
7409	210040	00190	FOUR	LD HL, 4002H	:LAST ADDRESS SECTION
7410	3000	00200		LD A, 000	
7411	000174	00210		CALL SUB	
7412	000000	00220		JP 0000H	:ENTER PREDEFINED DISMS
7413	7F	00230	SUB	LD (HL), A	:POKE 1ST BYTE
7414	23	00240		INC HL	:NEXT ADDRESS
7415	0000	00250		LD A, 000H	:NEXT BYTE
7416	7F	00260		LD (HL), A	:POKE IT
7417	23	00270		INC HL	:NEXT
7418	00	00280		OR A	:GET A = 0
7419	7F	00290		LD (HL), A	:POKE 2
7420	C9	00300		RET	
0000		00310		END	
00000	TOTAL 00000				
0000	7400				
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0000	7531				

Footer  
by Gordon Williams

## Open Forum

[illegible]

Year	Number of cases	Percentage of cases
1990	10	10.0
1991	15	15.0
1992	20	20.0
1993	25	25.0
1994	30	30.0
1995	35	35.0
1996	40	40.0
1997	45	45.0
1998	50	50.0
1999	55	55.0
2000	60	60.0
2001	65	65.0
2002	70	70.0
2003	75	75.0
2004	80	80.0
2005	85	85.0
2006	90	90.0
2007	95	95.0
2008	100	100.0
2009	105	105.0
2010	110	110.0
2011	115	115.0
2012	120	120.0
2013	125	125.0
2014	130	130.0
2015	135	135.0
2016	140	140.0
2017	145	145.0
2018	150	150.0
2019	155	155.0
2020	160	160.0
2021	165	165.0
2022	170	170.0
2023	175	175.0
2024	180	180.0
2025	185	185.0
2026	190	190.0
2027	195	195.0
2028	200	200.0
2029	205	205.0
2030	210	210.0
2031	215	215.0
2032	220	220.0
2033	225	225.0
2034	230	230.0
2035	235	235.0
2036	240	240.0
2037	245	245.0
2038	250	250.0
2039	255	255.0
2040	260	260.0
2041	265	265.0
2042	270	270.0
2043	275	275.0
2044	280	280.0
2045	285	285.0
2046	290	290.0
2047	295	295.0
2048	300	300.0
2049	305	305.0
2050	310	310.0
2051	315	315.0
2052	320	320.0
2053	325	325.0
2054	330	330.0
2055	335	335.0
2056	340	340.0
2057	345	345.0
2058	350	350.0
2059	355	355.0
2060	360	360.0
2061	365	365.0
2062	370	370.0
2063	375	375.0
2064	380	380.0
2065	385	385.0
2066	390	390.0
2067	395	395.0
2068	400	400.0
2069	405	405.0
2070	410	410.0
2071	415	415.0
2072	420	420.0
2073	425	425.0
2074	430	430.0
2075	435	435.0
2076	440	440.0
2077	445	445.0
2078	450	450.0
2079	455	455.0
2080	460	460.0
2081	465	465.0
2082	470	470.0
2083	475	475.0
2084	480	480.0
2085	485	485.0
2086	490	490.0
2087	495	495.0
2088	500	500.0
2089	505	505.0
2090	510	510.0
2091	515	515.0
2092	520	520.0
2093	525	525.0
2094	530	530.0
2095	535	535.0
2096	540	540.0
2097	545	545.0
2098	550	550.0
2099	555	555.0
2100		

**valid page code** — Any number or letter that is entered, which does not remain on hand. May be needed if referred to hand book's column directions.

**Abstract**

[illegible]

There is a fun program which explores an invariant using not less than 28 characters from the left-hand top corner to the right-hand bottom corner.

The program could be compared to about five lines of the string, is pre-optimized and therefore can be used as the the for a program. These used in this way and found it to be most effective and only missing especially when accounts

Using the NCR/S statement you can position the text cursor at any position on the screen, and therefore a smoother movement can be achieved than jumping from one character position to another.

[illegible]

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

## Charles Andrew McGee, Jr.

[illegible]

The program considers two signs of data abuse — the date if the data requests a large number of data within the input operation and a choice. The order of the marks the last the detector and the last the detector.

The program uses the first instance only. The three latter versions — 50V602 — up to the present — 2314. The year is not complete. It being assumed that the year is the same constant and obvious.

1. Data input will be by use of three keyboards followed by reading.
2. The program learns the first hypothesis to each case.

**Editor: Marilyn Mayall**  
**Art Editor: Susan G. Johnson**

[illegible]

## Open Forum

**Figure 6**

[illegible]

- The next day of the last September will be the day of the month.
- If the day consists of a single digit, a space will automatically be put before the last digit of the month and this digit.
- YMD-date to be entered is the same as the last date entry, that the last date can be repeated.
- The program will repeat calculations date — see 2.00000

As it stands, the program will produce a change in three counties. A study of the three counties after 20- or 30-years, some very valid, changes are interesting insight into the economic conditions.

U.S. Dept. of Housing & Urban Development  
Washington, D.C. 20410

[illegible]

Year	Number of cases	Percentage of cases
1990	10	10.0
1991	15	15.0
1992	20	20.0
1993	25	25.0
1994	30	30.0
1995	35	35.0
1996	40	40.0
1997	45	45.0
1998	50	50.0
1999	55	55.0
2000	60	60.0
2001	65	65.0
2002	70	70.0
2003	75	75.0
2004	80	80.0
2005	85	85.0
2006	90	90.0
2007	95	95.0
2008	100	100.0
2009	105	105.0
2010	110	110.0
2011	115	115.0
2012	120	120.0
2013	125	125.0
2014	130	130.0
2015	135	135.0
2016	140	140.0
2017	145	145.0
2018	150	150.0
2019	155	155.0
2020	160	160.0
2021	165	165.0
2022	170	170.0
2023	175	175.0
2024	180	180.0
2025	185	185.0
2026	190	190.0
2027	195	195.0
2028	200	200.0
2029	205	205.0
2030	210	210.0
2031	215	215.0
2032	220	220.0
2033	225	225.0
2034	230	230.0
2035	235	235.0
2036	240	240.0
2037	245	245.0
2038	250	250.0
2039	255	255.0
2040	260	260.0
2041	265	265.0
2042	270	270.0
2043	275	275.0
2044	280	280.0
2045	285	285.0
2046	290	290.0
2047	295	295.0
2048	300	300.0
2049	305	305.0
2050	310	310.0
2051	315	315.0
2052	320	320.0
2053	325	325.0
2054	330	330.0
2055	335	335.0
2056	340	340.0
2057	345	345.0
2058	350	350.0
2059	355	355.0
2060	360	360.0
2061	365	365.0
2062	370	370.0
2063	375	375.0
2064	380	380.0
2065	385	385.0
2066	390	390.0
2067	395	395.0
2068	400	400.0
2069	405	405.0
2070	410	410.0
2071	415	415.0
2072	420	420.0
2073	425	425.0
2074	430	430.0
2075	435	435.0
2076	440	440.0
2077	445	445.0
2078	450	450.0
2079	455	455.0
2080	460	460.0
2081	465	465.0
2082	470	470.0
2083	475	475.0
2084	480	480.0
2085	485	485.0
2086	490	490.0
2087	495	495.0
2088	500	500.0
2089	505	505.0
2090	510	510.0
2091	515	515.0
2092	520	520.0
2093	525	525.0
2094	530	530.0
2095	535	535.0
2096	540	540.0
2097	545	545.0
2098	550	550.0
2099	555	555.0
2100		

Employee	Age	Salary	Gender	Marital Status
John Doe	35	\$50,000	Male	Married
Jane Smith	28	\$45,000	Female	Single
Mike Johnson	42	\$60,000	Male	Married
Sarah Brown	31	\$55,000	Female	Married
David Wilson	25	\$40,000	Male	Single

If the data to be entered is the same as the previous entry then enter F01 for a repeat. The double F is to make doubly sure that the entry is deliberate and not a mistake.

This may seem a waste of memory just for a date entry but anything that makes programming easier is worth while. In the memory is available who not use it.

100

100

The signal of this popular game is to look for strings of randomly generated digits into the string "10101010". The only way you are allowed to do this is by searching the first 10 digits.

The special feature of this program is that it encompasses both vertical (by physically shifting individual digits around the screen) and horizontal rotations.

- (a) Display title screen (PROCEDURE)
- (b) Display playing instructions, if requested (PROCEDURE)
- (c) Generate random string of 8 digits
- (d) Reverse the first 4 digits (PROCEDURE)
- (e) Test for successful completion
- (f) Repeat success by flashing the completed screen (PROCEDURE)

Although the research is preliminary, the project suggests the use of various low-cost solutions.

```

100 PRINT TAB(2);C1;
110 IF C1=0 THEN GOTO 300
120 IF C1=1 THEN GOTO 300
130 IF C1=2 THEN GOTO 300
140 IF C1=3 THEN GOTO 300
150 IF C1=4 THEN GOTO 300
160 IF C1=5 THEN GOTO 300
170 IF C1=6 THEN GOTO 300
180 IF C1=7 THEN GOTO 300
190 IF C1=8 THEN GOTO 300
200 IF C1=9 THEN GOTO 300
210 IF C1=10 THEN GOTO 300
220 IF C1=11 THEN GOTO 300
230 IF C1=12 THEN GOTO 300
240 IF C1=13 THEN GOTO 300
250 IF C1=14 THEN GOTO 300
260 IF C1=15 THEN GOTO 300
270 IF C1=16 THEN GOTO 300
280 IF C1=17 THEN GOTO 300
290 IF C1=18 THEN GOTO 300
300 PRINT TAB(2);C1;
310 FOR J=0 TO 11
320 IF J=0 THEN LET C1=0 TO 1
330 IF J=1 THEN LET C1=1 TO 2
340 IF J=2 THEN LET C1=2 TO 3
350 IF J=3 THEN LET C1=3 TO 4
360 IF J=4 THEN LET C1=4 TO 5
370 IF J=5 THEN LET C1=5 TO 6
380 IF J=6 THEN LET C1=6 TO 7
390 IF J=7 THEN LET C1=7 TO 8
400 IF J=8 THEN LET C1=8 TO 9
410 IF J=9 THEN LET C1=9 TO 10
420 IF J=10 THEN LET C1=10 TO 11
430 IF J=11 THEN LET C1=11 TO 12
440 IF J=12 THEN LET C1=12 TO 13
450 IF J=13 THEN LET C1=13 TO 14
460 IF J=14 THEN LET C1=14 TO 15
470 IF J=15 THEN LET C1=15 TO 16
480 IF J=16 THEN LET C1=16 TO 17
490 IF J=17 THEN LET C1=17 TO 18
500 IF J=18 THEN LET C1=18 TO 19
510 IF J=19 THEN LET C1=19 TO 20
520 IF J=20 THEN LET C1=20 TO 21
530 IF J=21 THEN LET C1=21 TO 22
540 IF J=22 THEN LET C1=22 TO 23
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560 IF J=24 THEN LET C1=24 TO 25
570 IF J=25 THEN LET C1=25 TO 26
580 IF J=26 THEN LET C1=26 TO 27
590 IF J=27 THEN LET C1=27 TO 28
600 IF J=28 THEN LET C1=28 TO 29
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740 IF J=42 THEN LET C1=42 TO 43
750 IF J=43 THEN LET C1=43 TO 44
760 IF J=44 THEN LET C1=44 TO 45
770 IF J=45 THEN LET C1=45 TO 46
780 IF J=46 THEN LET C1=46 TO 47
790 IF J=47 THEN LET C1=47 TO 48
800 IF J=48 THEN LET C1=48 TO 49
810 IF J=49 THEN LET C1=49 TO 50
820 IF J=50 THEN LET C1=50 TO 51
830 IF J=51 THEN LET C1=51 TO 52
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1010 IF J=69 THEN LET C1=69 TO 70
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1990 IF J=167 THEN LET C1=167 TO 168
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2010 IF J=169 THEN LET C1=169 TO 170
2020 IF J=170 THEN LET C1=170 TO 171
2030 IF J=171 THEN LET C1=171 TO 172
2040 IF J=172 THEN LET
```

44

[illegible]

BOOKS RECEIVED



1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

Figure 1

```

10 REM "MATHS" by Peter Kemp
11 DIM A(10)
12 FOR I = 1 TO 10
13   A(I) = INT(RND*10)
14 NEXT I
15 PRINT "Array A: ";
16 FOR I = 1 TO 10
17   PRINT A(I);
18 NEXT I
19 PRINT
20 DIM B(10)
21 FOR I = 1 TO 10
22   B(I) = INT(RND*10)
23 NEXT I
24 PRINT "Array B: ";
25 FOR I = 1 TO 10
26   PRINT B(I);
27 NEXT I
28 PRINT
29 DIM C(10)
30 FOR I = 1 TO 10
31   C(I) = INT(RND*10)
32 NEXT I
33 PRINT "Array C: ";
34 FOR I = 1 TO 10
35   PRINT C(I);
36 NEXT I
37 PRINT
38 DIM D(10)
39 FOR I = 1 TO 10
40   D(I) = INT(RND*10)
41 NEXT I
42 PRINT "Array D: ";
43 FOR I = 1 TO 10
44   PRINT D(I);
45 NEXT I
46 PRINT
47 DIM E(10)
48 FOR I = 1 TO 10
49   E(I) = INT(RND*10)
50 NEXT I
51 PRINT "Array E: ";
52 FOR I = 1 TO 10
53   PRINT E(I);
54 NEXT I
55 PRINT
56 DIM F(10)
57 FOR I = 1 TO 10
58   F(I) = INT(RND*10)
59 NEXT I
60 PRINT "Array F: ";
61 FOR I = 1 TO 10
62   PRINT F(I);
63 NEXT I
64 PRINT
65 DIM G(10)
66 FOR I = 1 TO 10
67   G(I) = INT(RND*10)
68 NEXT I
69 PRINT "Array G: ";
70 FOR I = 1 TO 10
71   PRINT G(I);
72 NEXT I
73 PRINT
74 DIM H(10)
75 FOR I = 1 TO 10
76   H(I) = INT(RND*10)
77 NEXT I
78 PRINT "Array H: ";
79 FOR I = 1 TO 10
80   PRINT H(I);
81 NEXT I
82 PRINT
83 DIM I(10)
84 FOR I = 1 TO 10
85   I(I) = INT(RND*10)
86 NEXT I
87 PRINT "Array I: ";
88 FOR I = 1 TO 10
89   PRINT I(I);
90 NEXT I
91 PRINT
92 DIM J(10)
93 FOR I = 1 TO 10
94   J(I) = INT(RND*10)
95 NEXT I
96 PRINT "Array J: ";
97 FOR I = 1 TO 10
98   PRINT J(I);
99 NEXT I
100 PRINT
101 DIM K(10)
102 FOR I = 1 TO 10
103   K(I) = INT(RND*10)
104 NEXT I
105 PRINT "Array K: ";
106 FOR I = 1 TO 10
107   PRINT K(I);
108 NEXT I
109 PRINT
110 DIM L(10)
111 FOR I = 1 TO 10
112   L(I) = INT(RND*10)
113 NEXT I
114 PRINT "Array L: ";
115 FOR I = 1 TO 10
116   PRINT L(I);
117 NEXT I
118 PRINT
119 DIM M(10)
120 FOR I = 1 TO 10
121   M(I) = INT(RND*10)
122 NEXT I
123 PRINT "Array M: ";
124 FOR I = 1 TO 10
125   PRINT M(I);
126 NEXT I
127 PRINT
128 DIM N(10)
129 FOR I = 1 TO 10
130   N(I) = INT(RND*10)
131 NEXT I
132 PRINT "Array N: ";
133 FOR I = 1 TO 10
134   PRINT N(I);
135 NEXT I
136 PRINT
137 DIM O(10)
138 FOR I = 1 TO 10
139   O(I) = INT(RND*10)
140 NEXT I
141 PRINT "Array O: ";
142 FOR I = 1 TO 10
143   PRINT O(I);
144 NEXT I
145 PRINT
146 DIM P(10)
147 FOR I = 1 TO 10
148   P(I) = INT(RND*10)
149 NEXT I
150 PRINT "Array P: ";
151 FOR I = 1 TO 10
152   PRINT P(I);
153 NEXT I
154 PRINT
155 DIM Q(10)
156 FOR I = 1 TO 10
157   Q(I) = INT(RND*10)
158 NEXT I
159 PRINT "Array Q: ";
160 FOR I = 1 TO 10
161   PRINT Q(I);
162 NEXT I
163 PRINT
164 DIM R(10)
165 FOR I = 1 TO 10
166   R(I) = INT(RND*10)
167 NEXT I
168 PRINT "Array R: ";
169 FOR I = 1 TO 10
170   PRINT R(I);
171 NEXT I
172 PRINT
173 DIM S(10)
174 FOR I = 1 TO 10
175   S(I) = INT(RND*10)
176 NEXT I
177 PRINT "Array S: ";
178 FOR I = 1 TO 10
179   PRINT S(I);
180 NEXT I
181 PRINT
182 DIM T(10)
183 FOR I = 1 TO 10
184   T(I) = INT(RND*10)
185 NEXT I
186 PRINT "Array T: ";
187 FOR I = 1 TO 10
188   PRINT T(I);
189 NEXT I
190 PRINT
191 DIM U(10)
192 FOR I = 1 TO 10
193   U(I) = INT(RND*10)
194 NEXT I
195 PRINT "Array U: ";
196 FOR I = 1 TO 10
197   PRINT U(I);
198 NEXT I
199 PRINT
200 DIM V(10)
201 FOR I = 1 TO 10
202   V(I) = INT(RND*10)
203 NEXT I
204 PRINT "Array V: ";
205 FOR I = 1 TO 10
206   PRINT V(I);
207 NEXT I
208 PRINT
209 DIM W(10)
210 FOR I = 1 TO 10
211   W(I) = INT(RND*10)
212 NEXT I
213 PRINT "Array W: ";
214 FOR I = 1 TO 10
215   PRINT W(I);
216 NEXT I
217 PRINT
218 DIM X(10)
219 FOR I = 1 TO 10
220   X(I) = INT(RND*10)
221 NEXT I
222 PRINT "Array X: ";
223 FOR I = 1 TO 10
224   PRINT X(I);
225 NEXT I
226 PRINT
227 DIM Y(10)
228 FOR I = 1 TO 10
229   Y(I) = INT(RND*10)
230 NEXT I
231 PRINT "Array Y: ";
232 FOR I = 1 TO 10
233   PRINT Y(I);
234 NEXT I
235 PRINT
236 DIM Z(10)
237 FOR I = 1 TO 10
238   Z(I) = INT(RND*10)
239 NEXT I
240 PRINT "Array Z: ";
241 FOR I = 1 TO 10
242   PRINT Z(I);
243 NEXT I
244 PRINT
245 DIM AA(10)
246 FOR I = 1 TO 10
247   AA(I) = INT(RND*10)
248 NEXT I
249 PRINT "Array AA: ";
250 FOR I = 1 TO 10
251   PRINT AA(I);
252 NEXT I
253 PRINT
254 DIM AB(10)
255 FOR I = 1 TO 10
256   AB(I) = INT(RND*10)
257 NEXT I
258 PRINT "Array AB: ";
259 FOR I = 1 TO 10
260   PRINT AB(I);
261 NEXT I
262 PRINT
263 DIM AC(10)
264 FOR I = 1 TO 10
265   AC(I) = INT(RND*10)
266 NEXT I
267 PRINT "Array AC: ";
268 FOR I = 1 TO 10
269   PRINT AC(I);
270 NEXT I
271 PRINT
272 DIM AD(10)
273 FOR I = 1 TO 10
274   AD(I) = INT(RND*10)
275 NEXT I
276 PRINT "Array AD: ";
277 FOR I = 1 TO 10
278   PRINT AD(I);
279 NEXT I
280 PRINT
281 DIM AE(10)
282 FOR I = 1 TO 10
283   AE(I) = INT(RND*10)
284 NEXT I
285 PRINT "Array AE: ";
286 FOR I = 1 TO 10
287   PRINT AE(I);
288 NEXT I
289 PRINT
290 DIM AF(10)
291 FOR I = 1 TO 10
292   AF(I) = INT(RND*10)
293 NEXT I
294 PRINT "Array AF: ";
295 FOR I = 1 TO 10
296   PRINT AF(I);
297 NEXT I
298 PRINT
299 DIM AG(10)
300 FOR I = 1 TO 10
301   AG(I) = INT(RND*10)
302 NEXT I
303 PRINT "Array AG: ";
304 FOR I = 1 TO 10
305   PRINT AG(I);
306 NEXT I
307 PRINT
308 DIM AH(10)
309 FOR I = 1 TO 10
310   AH(I) = INT(RND*10)
311 NEXT I
312 PRINT "Array AH: ";
313 FOR I = 1 TO 10
314   PRINT AH(I);
315 NEXT I
316 PRINT
317 DIM AI(10)
318 FOR I = 1 TO 10
319   AI(I) = INT(RND*10)
320 NEXT I
321 PRINT "Array AI: ";
322 FOR I = 1 TO 10
323   PRINT AI(I);
324 NEXT I
325 PRINT
326 DIM AJ(10)
327 FOR I = 1 TO 10
328   AJ(I) = INT(RND*10)
329 NEXT I
330 PRINT "Array AJ: ";
331 FOR I = 1 TO 10
332   PRINT AJ(I);
333 NEXT I
334 PRINT
335 DIM AK(10)
336 FOR I = 1 TO 10
337   AK(I) = INT(RND*10)
338 NEXT I
339 PRINT "Array AK: ";
340 FOR I = 1 TO 10
341   PRINT AK(I);
342 NEXT I
343 PRINT
344 DIM AL(10)
345 FOR I = 1 TO 10
346   AL(I) = INT(RND*10)
347 NEXT I
348 PRINT "Array AL: ";
349 FOR I = 1 TO 10
350   PRINT AL(I);
351 NEXT I
352 PRINT
353 DIM AM(10)
354 FOR I = 1 TO 10
355   AM(I) = INT(RND*10)
356 NEXT I
357 PRINT "Array AM: ";
358 FOR I = 1 TO 10
359   PRINT AM(I);
360 NEXT I
361 PRINT
362 DIM AN(10)
363 FOR I = 1 TO 10
364   AN(I) = INT(RND*10)
365 NEXT I
366 PRINT "Array AN: ";
367 FOR I = 1 TO 10
368   PRINT AN(I);
369 NEXT I
370 PRINT
371 DIM AO(10)
372 FOR I = 1 TO 10
373   AO(I) = INT(RND*10)
374 NEXT I
375 PRINT "Array AO: ";
376 FOR I = 1 TO 10
377   PRINT AO(I);
378 NEXT I
379 PRINT
380 DIM AP(10)
381 FOR I = 1 TO 10
382   AP(I) = INT(RND*10)
383 NEXT I
384 PRINT "Array AP: ";
385 FOR I = 1 TO 10
386   PRINT AP(I);
387 NEXT I
388 PRINT
389 DIM AQ(10)
390 FOR I = 1 TO 10
391   AQ(I) = INT(RND*10)
392 NEXT I
393 PRINT "Array AQ: ";
394 FOR I = 1 TO 10
395   PRINT AQ(I);
396 NEXT I
397 PRINT
398 DIM AR(10)
399 FOR I = 1 TO 10
400   AR(I) = INT(RND*10)
401 NEXT I
402 PRINT "Array AR: ";
403 FOR I = 1 TO 10
404   PRINT AR(I);
405 NEXT I
406 PRINT
407 DIM AS(10)
408 FOR I = 1 TO 10
409   AS(I) = INT(RND*10)
410 NEXT I
411 PRINT "Array AS: ";
412 FOR I = 1 TO 10
413   PRINT AS(I);
414 NEXT I
415 PRINT
416 DIM AT(10)
417 FOR I = 1 TO 10
418   AT(I) = INT(RND*10)
419 NEXT I
420 PRINT "Array AT: ";
421 FOR I = 1 TO 10
422   PRINT AT(I);
423 NEXT I
424 PRINT
425 DIM AU(10)
426 FOR I = 1 TO 10
427   AU(I) = INT(RND*10)
428 NEXT I
429 PRINT "Array AU: ";
430 FOR I = 1 TO 10
431   PRINT AU(I);
432 NEXT I
433 PRINT
434 DIM AV(10)
435 FOR I = 1 TO 10
436   AV(I) = INT(RND
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# Open Forum

510 PRINT "The object of the game is to rearrange" "the digits into the number "123456789", " "with as few moves as possible."

520 PRINT "To make a move, enter a single digit," "in the range 1 to 9, the computer will" "reverse that number of digits, counting from the 1st."

530 PRINT:PRINT "WHEN YOU ARE READY TO START, PRESS"

540 INPUT "PRESS ANY KEY":GOTO 550

550 INPUT "PRESS ANY KEY":GOTO 560

560 INPUT "PRESS ANY KEY":GOTO 570

570 FOR I=1 TO 9:FOR J=1 TO 9:FOR K=1 TO 9

580 INPUT "PRESS ANY KEY":GOTO 590

590 IF I=J AND J=K THEN GOTO 600

600 FOR L=1 TO 9:FOR M=1 TO 9:FOR N=1 TO 9

610 INPUT "PRESS ANY KEY":GOTO 620

620 IF L=I AND I=J AND J=K THEN GOTO 630

630 FOR O=1 TO 9:FOR P=1 TO 9:FOR Q=1 TO 9

640 INPUT "PRESS ANY KEY":GOTO 650

650 IF O=I AND I=J AND J=K THEN GOTO 660

660 IF O=I AND I=J AND J=K THEN GOTO 670

670 IF O=I AND I=J AND J=K THEN GOTO 680

680 IF O=I AND I=J AND J=K THEN GOTO 690

690 IF O=I AND I=J AND J=K THEN GOTO 700

700 IF O=I AND I=J AND J=K THEN GOTO 710

710 IF O=I AND I=J AND J=K THEN GOTO 720

720 IF O=I AND I=J AND J=K THEN GOTO 730

730 IF O=I AND I=J AND J=K THEN GOTO 740

740 IF O=I AND I=J AND J=K THEN GOTO 750

750 IF O=I AND I=J AND J=K THEN GOTO 760

760 IF O=I AND I=J AND J=K THEN GOTO 770

770 IF O=I AND I=J AND J=K THEN GOTO 780

780 IF O=I AND I=J AND J=K THEN GOTO 790

790 IF O=I AND I=J AND J=K THEN GOTO 800

800 IF O=I AND I=J AND J=K THEN GOTO 810

810 IF O=I AND I=J AND J=K THEN GOTO 820

820 IF O=I AND I=J AND J=K THEN GOTO 830

830 IF O=I AND I=J AND J=K THEN GOTO 840

840 IF O=I AND I=J AND J=K THEN GOTO 850

850 IF O=I AND I=J AND J=K THEN GOTO 860

860 IF O=I AND I=J AND J=K THEN GOTO 870

870 IF O=I AND I=J AND J=K THEN GOTO 880

880 IF O=I AND I=J AND J=K THEN GOTO 890

890 IF O=I AND I=J AND J=K THEN GOTO 900

900 IF O=I AND I=J AND J=K THEN GOTO 910

910 IF O=I AND I=J AND J=K THEN GOTO 920

920 IF O=I AND I=J AND J=K THEN GOTO 930

930 IF O=I AND I=J AND J=K THEN GOTO 940

940 IF O=I AND I=J AND J=K THEN GOTO 950

950 IF O=I AND I=J AND J=K THEN GOTO 960

960 IF O=I AND I=J AND J=K THEN GOTO 970

970 IF O=I AND I=J AND J=K THEN GOTO 980

980 IF O=I AND I=J AND J=K THEN GOTO 990

990 IF O=I AND I=J AND J=K THEN GOTO 1000

1000 IF O=I AND I=J AND J=K THEN GOTO 1010

1010 IF O=I AND I=J AND J=K THEN GOTO 1020

1020 IF O=I AND I=J AND J=K THEN GOTO 1030

1030 IF O=I AND I=J AND J=K THEN GOTO 1040

1040 IF O=I AND I=J AND J=K THEN GOTO 1050

1050 IF O=I AND I=J AND J=K THEN GOTO 1060

1060 IF O=I AND I=J AND J=K THEN GOTO 1070

1070 IF O=I AND I=J AND J=K THEN GOTO 1080

1080 IF O=I AND I=J AND J=K THEN GOTO 1090

1090 IF O=I AND I=J AND J=K THEN GOTO 1100

1100 IF O=I AND I=J AND J=K THEN GOTO 1110

1110 IF O=I AND I=J AND J=K THEN GOTO 1120

1120 IF O=I AND I=J AND J=K THEN GOTO 1130

1130 IF O=I AND I=J AND J=K THEN GOTO 1140

1140 IF O=I AND I=J AND J=K THEN GOTO 1150

1150 IF O=I AND I=J AND J=K THEN GOTO 1160

1160 IF O=I AND I=J AND J=K THEN GOTO 1170

1170 IF O=I AND I=J AND J=K THEN GOTO 1180

1180 IF O=I AND I=J AND J=K THEN GOTO 1190

1190 IF O=I AND I=J AND J=K THEN GOTO 1200

1200 IF O=I AND I=J AND J=K THEN GOTO 1210

1210 IF O=I AND I=J AND J=K THEN GOTO 1220

1220 IF O=I AND I=J AND J=K THEN GOTO 1230

1230 IF O=I AND I=J AND J=K THEN GOTO 1240

1240 IF O=I AND I=J AND J=K THEN GOTO 1250

1250 IF O=I AND I=J AND J=K THEN GOTO 1260

1260 IF O=I AND I=J AND J=K THEN GOTO 1270

1270 IF O=I AND I=J AND J=K THEN GOTO 1280

1280 IF O=I AND I=J AND J=K THEN GOTO 1290

1290 IF O=I AND I=J AND J=K THEN GOTO 1300

1300 IF O=I AND I=J AND J=K THEN GOTO 1310

1310 IF O=I AND I=J AND J=K THEN GOTO 1320

1320 IF O=I AND I=J AND J=K THEN GOTO 1330

1330 IF O=I AND I=J AND J=K THEN GOTO 1340

1340 IF O=I AND I=J AND J=K THEN GOTO 1350

1350 IF O=I AND I=J AND J=K THEN GOTO 1360

1360 IF O=I AND I=J AND J=K THEN GOTO 1370

1370 IF O=I AND I=J AND J=K THEN GOTO 1380

1380 IF O=I AND I=J AND J=K THEN GOTO 1390

1390 IF O=I AND I=J AND J=K THEN GOTO 1400

1400 IF O=I AND I=J AND J=K THEN GOTO 1410

1410 IF O=I AND I=J AND J=K THEN GOTO 1420

1420 IF O=I AND I=J AND J=K THEN GOTO 1430

1430 IF O=I AND I=J AND J=K THEN GOTO 1440

1440 IF O=I AND I=J AND J=K THEN GOTO 1450

1450 IF O=I AND I=J AND J=K THEN GOTO 1460

1460 IF O=I AND I=J AND J=K THEN GOTO 1470

1470 IF O=I AND I=J AND J=K THEN GOTO 1480

1480 IF O=I AND I=J AND J=K THEN GOTO 1490

1490 IF O=I AND I=J AND J=K THEN GOTO 1500

1500 IF O=I AND I=J AND J=K THEN GOTO 1510

1510 IF O=I AND I=J AND J=K THEN GOTO 1520

1520 IF O=I AND I=J AND J=K THEN GOTO 1530

1530 IF O=I AND I=J AND J=K THEN GOTO 1540

1540 IF O=I AND I=J AND J=K THEN GOTO 1550

1550 IF O=I AND I=J AND J=K THEN GOTO 1560

1560 IF O=I AND I=J AND J=K THEN GOTO 1570

1570 IF O=I AND I=J AND J=K THEN GOTO 1580

1580 IF O=I AND I=J AND J=K THEN GOTO 1590

1590 IF O=I AND I=J AND J=K THEN GOTO 1600

1600 IF O=I AND I=J AND J=K THEN GOTO 1610

1610 IF O=I AND I=J AND J=K THEN GOTO 1620

1620 IF O=I AND I=J AND J=K THEN GOTO 1630

1630 IF O=I AND I=J AND J=K THEN GOTO 1640

1640 IF O=I AND I=J AND J=K THEN GOTO 1650

1650 IF O=I AND I=J AND J=K THEN GOTO 1660

1660 IF O=I AND I=J AND J=K THEN GOTO 1670

1670 IF O=I AND I=J AND J=K THEN GOTO 1680

1680 IF O=I AND I=J AND J=K THEN GOTO 1690

1690 IF O=I AND I=J AND J=K THEN GOTO 1700

1700 IF O=I AND I=J AND J=K THEN GOTO 1710

1710 IF O=I AND I=J AND J=K THEN GOTO 1720

1720 IF O=I AND I=J AND J=K THEN GOTO 1730

1730 IF O=I AND I=J AND J=K THEN GOTO 1740

1740 IF O=I AND I=J AND J=K THEN GOTO 1750

1750 IF O=I AND I=J AND J=K THEN GOTO 1760

1760 IF O=I AND I=J AND J=K THEN GOTO 1770

1770 IF O=I AND I=J AND J=K THEN GOTO 1780

1780 IF O=I AND I=J AND J=K THEN GOTO 1790

1790 IF O=I AND I=J AND J=K THEN GOTO 1800

1800 IF O=I AND I=J AND J=K THEN GOTO 1810

1810 IF O=I AND I=J AND J=K THEN GOTO 1820

1820 IF O=I AND I=J AND J=K THEN GOTO 1830

1830 IF O=I AND I=J AND J=K THEN GOTO 1840

1840 IF O=I AND I=J AND J=K THEN GOTO 1850

1850 IF O=I AND I=J AND J=K THEN GOTO 1860

1860 IF O=I AND I=J AND J=K THEN GOTO 1870

1870 IF O=I AND I=J AND J=K THEN GOTO 1880

1880 IF O=I AND I=J AND J=K THEN GOTO 1890

1890 IF O=I AND I=J AND J=K THEN GOTO 1900

1900 IF O=I AND I=J AND J=K THEN GOTO 1910

1910 IF O=I AND I=J AND J=K THEN GOTO 1920

1920 IF O=I AND I=J AND J=K THEN GOTO 1930

1930 IF O=I AND I=J AND J=K THEN GOTO 1940

1940 IF O=I AND I=J AND J=K THEN GOTO 1950

1950 IF O=I AND I=J AND J=K THEN GOTO 1960

1960 IF O=I AND I=J AND J=K THEN GOTO 1970

1970 IF O=I AND I=J AND J=K THEN GOTO 1980

1980 IF O=I AND I=J AND J=K THEN GOTO 1990

1990 IF O=I AND I=J AND J=K THEN GOTO 2000

2000 IF O=I AND I=J AND J=K THEN GOTO 2010

2010 IF O=I AND I=J AND J=K THEN GOTO 2020

2020 IF O=I AND I=J AND J=K THEN GOTO 2030

2030 IF O=I AND I=J AND J=K THEN GOTO 2040

2040 IF O=I AND I=J AND J=K THEN GOTO 2050

## Win the great new ZX Spectrum

At once here is an 80 to enter the award scheme to win a ZX Spectrum II one of the following categories: (a) Games, (b) Educational/Scientific, (c) Business/Office, (d) Utility.

Programs for each category should be accompanied by a cassette, a copy of the listing and full documentation. Please include evidence for use of machine code, innovation, structure and ease of use.

The overall winner will receive a ZX Spectrum and Printer. Individual category winners will be awarded prizes in software, and 24 runners up will receive programming staff awards.

A competition coupon will be published in next week's issue of Popular Computing Weekly. To enter the competition, you must send in your program together with any four differently numbered coupons to:

Popular Computing Weekly,  
Programming Award Scheme,  
Magazines Court,  
100 Brookmans Road,  
London W3 6LS

1. Please do not post your entries unless you are sure of delivery with your programme. Do not include any other material in your entry.
2. Competition for entries begins on 1st July.

3. Entrants must be at least 16 years of age.
4. Entrants must be UK residents.
5. Entrants must be UK residents.
6. Entrants must be UK residents.

### Popular Computing Weekly Programming Award Scheme

1. Enter this coupon when you have collected four differently numbered coupons, send them with your program to: Popular Computing Weekly, Programming Award Scheme, Magazines Court, 100 Brookmans Road, London W3 6LS.



NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PROGRAM/ENTRY NO: \_\_\_\_\_

4



# Programming

PROGRAM 41

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

ENTERED FOR PROGRAM 41

LISTING FOR COMMENTS 2 TO 40

Line	1	2	3	4	5	6	7	8
10	FOR A=0 TO 40							
20	INPUT "ENTER A: "	A						
30	IF A=0 THEN GOTO 40							
40	INPUT "ENTER B: "	B						
50	IF B=0 THEN GOTO 40							
60	PRINT "ENTER C: "	C						
70	LET C=ABS(A-B)+ABS(A+B)							
80	PRINT "ENTER D: "	D						
90	PRINT "ENTER E: "	E						
100	INPUT "ENTER F: "	F						
110	IF F=0 THEN GOTO 40							
120	LET G=A+B+C+D+E+F							
130	PRINT "SUM: "	G						
140	GOTO 40							

PROGRAM 42

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

PROGRAM 43

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

PROGRAM 44

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

ENTERED FOR PROGRAM 45

Line	1	2	3	4	5	6	7	8
10	FOR A=0 TO 40							
20	INPUT "ENTER A: "	A						
30	IF A=0 THEN GOTO 40							
40	INPUT "ENTER B: "	B						
50	IF B=0 THEN GOTO 40							
60	PRINT "ENTER C: "	C						
70	LET C=ABS(A-B)+ABS(A+B)							
80	PRINT "ENTER D: "	D						
90	PRINT "ENTER E: "	E						
100	INPUT "ENTER F: "	F						
110	IF F=0 THEN GOTO 40							
120	LET G=A+B+C+D+E+F							
130	PRINT "SUM: "	G						
140	GOTO 40							

PROGRAM 46

1. FOR A=0 TO 40

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```

ENTERED FOR PROGRAM 47

Line	1	2	3	4	5	6	7	8
10	FOR A=0 TO 40							
20	INPUT "ENTER A: "	A						
30	IF A=0 THEN GOTO 40							
40	INPUT "ENTER B: "	B						
50	IF B=0 THEN GOTO 40							
60	PRINT "ENTER C: "	C						
70	LET C=ABS(A-B)+ABS(A+B)							
80	PRINT "ENTER D: "	D						
90	PRINT "ENTER E: "	E						
100	INPUT "ENTER F: "	F						
110	IF F=0 THEN GOTO 40							
120	LET G=A+B+C+D+E+F							
130	PRINT "SUM: "	G						
140	GOTO 40							

PROGRAM 48

```
10 FOR A=0 TO 40
20 INPUT "ENTER A: " A
30 IF A=0 THEN GOTO 40
40 INPUT "ENTER B: " B
50 IF B=0 THEN GOTO 40
60 PRINT "ENTER C: " C
70 LET C=ABS(A-B)+ABS(A+B)
80 PRINT "ENTER D: " D
90 PRINT "ENTER E: " E
100 INPUT "ENTER F: " F
110 IF F=0 THEN GOTO 40
120 LET G=A+B+C+D+E+F
130 PRINT "SUM: " G
140 GOTO 40
```







# New ZX81 Software from Sinclair.

A whole new range of software for the Sinclair ZX81 Personal Computer is now available - direct from Sinclair. Produced by ICL and Paces, these really excellent cassette cover games, education, and business management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the 16K RAM pack, or in description of each cassette, shows if later retail hardware is required. The RAM pack provides 16 times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £29.95.

The Sinclair ZX81 offers full alphanumeric and highly sophisticated graphics. A special feature is COM which lets you find exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for examinations records. The ZX81 also plugs into the rear of your ZX80, and you can obtain a RAM pack as well.

## Games

### **Cassette 01: Super Programs 1 (ICL)**

Hardware required - ZX81.

Price - £4.95.

Programs - Invasion from Jupiter, Surface, Magic Square, Double Run, Liquid Cascade.

Description - Five games programs that may contribute towards your future studies.

### **Cassette 02: Super Programs 2 (ICL)**

Hardware required - ZX81.

Price - £4.95.

Programs - Rings around Saturn, Secret Code, Word Juggling, Silhouette, Memory Test, Memory Extension.

Description - Five games plus easy conversion between inches/feet/yards and centimetres/meters.

### **Cassette 03: Super Programs 3 (ICL)**

Hardware required - ZX81.

Price - £4.95.

Programs - Run Race, Challenge, Secret Message, Miss that Million, Character Code, Currency Conversion, Description - Five games plus easy conversion at will - for example, dollars to pounds.

### **Cassette 04: Super Programs 4 (ICL)**

Hardware required - ZX81.

Price - £4.95.

Programs - Clear Under Submarines, Decoding with Squares, The invisible Swindler, Reaction, Patrol, Description - Five games plus easy conversion between miles per gallon and European fuel consumption figures.

### **Cassette 05: Super Programs 5 (ICL)**

Hardware required - ZX81 + 16K RAM.

Price - £4.95.

Programs - Martian Kicks Out, Grapple, Find the Male, Labyrinth, Drop a Bomb, Continental.

Description - Five games plus easy conversion between English and Continental road signs.

### **Cassette 06: Super Programs 6 (ICL)**

Hardware required - ZX81 + 16K RAM.

Price - £4.95.

Programs - Galactic Invasion, Journey into Danger, Create New Hole, Get Battle, Daylight Robbery.

Description - Six games making full use of the ZX81's amazing graphics capability.

### **Cassette 07: Super Programs 7 (ICL)**

Hardware required - ZX81.

Price - £4.95.

Programs - Raceback, Chase, Hot, Tower of Hanoi, Docking the Spaceship, Sort.

Description - Six games including the fascinating Tower of Hanoi problem.

### **Cassette 08: Super Programs 8 (ICL)**

Hardware required - ZX81 + 16K RAM.

Price - £4.95.

Programs - Star Trail (plus Mark tape on side 2).

Description - Can you as Captain Church of the UK spaceship Endeavour, see the galaxy of the Amazon problem?

### **Cassette 09: Storytymes (ICL)**

Hardware required - ZX81 + 16K RAM.

Price - £3.95.

Programs - What are Storytymes? Your Storytymes.

Description - What will you read your poem (and enough physically, emotionally, and intellectually)?

### **Cassette 10: Backgrounds (Paces)**

Hardware required - ZX81 + 16K RAM.

Price - £3.95.

Programs - Backgrounds One.

Description - A great program, using fast and efficient machine code, with graphics board, using dice, and drawing lines. The dice program can be useful for any dice game.

### **Cassette 11: Chess (Paces)**

Hardware required - ZX81 + 16K RAM.

Price - £3.95.

Programs - Chess, Chess Clock, Description - Fast, efficient machine code, a superb display of the board and pieces, plus in levels of play, combine to make this one of the best Chess programs available. The Chess Clock program can be used at any time.



### **Cassette 12: Fantasy Games (Paces)**

Hardware required - ZX81 or ZX80

with 16K BASIC ROM - 16K RAM

Price - £4.75

Programs - Perious Swamp, Sorcerer's World

Description - Perious Swamp, rescue a beautiful princess from the evil sorcerer. Sorcerer's World, you're challenged. To escape, you'll probably need the help of the Great Sorcerer.

### **Cassette 13:**

#### **Space Racers and Bomber (Paces)**

Hardware required - ZX81 + 16K RAM

Price - £3.95

Programs - Space Racers, Bomber, Description - Space Racers is the ZX81 version of the popular pub game.

Bomber - develop a city before you're a sky-terror.

### **Cassette 14: Flight Simulation (Paces)**

Hardware required - ZX81 + 16K RAM

Price - £3.95

Programs - Flight Simulation - plus bank tape on side 2.

Description - Simulates a highly manoeuvrable light aircraft with full controls, information, a view through the cockpit windows, and navigational aids. Happy landing!

## Education

### **Cassette 15: For 11-12 year olds - English Literature 1 (ICL)**

Hardware required - ZX81 + 16K RAM

Price - £5.95

Programs - Newell's Authors, Description - Five words 'Robinson Crusoe' which remind you of you associate with Father Brown?

### **Cassette 16: For 12-13 year olds - English Literature 2 (ICL)**

Hardware required - ZX81 + 16K RAM

Price - £5.95

Programs - Poets, Playwrights, Modern Authors.

Description - Five words 'Song of the Blith' which playwright also played created for England?



### **Cassette 83: Fun to Learn series - Geography 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Rivers in England and Wales, Countries and Capitals of Europe  
**Description** - The computer shows you maps and lists of towns. You locate the towns on maps. On the computer challenge you to name a preselected location.

### **Cassette 84: Fun to Learn series - History 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Events in British History, British Monarchs  
**Description** - From 1660 to 1688, test your when important events occurred. Recognise monarchs in ascending order.

### **Cassette 85: Fun to Learn series - Mathematics 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Addition/Subtraction, Multiplication/Division  
**Description** - Questions and answers on basic mathematics at different levels of difficulty.

### **Cassette 86: Fun to Learn series - Music 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Composers, Musicians  
**Description** - Which instrument does James Galway play? Who composed 'Peter Dinkles'?

### **Cassette 87: Fun to Learn series - Inventions 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Inventions before 1800, Inventions since 1800  
**Description** - Who invented television? What was the 'dangerous lobster'?

### **Cassette 88: Fun to Learn series - Spelling 1 (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Programs** - Series A1-A25, Series B1-B25  
**Description** - Listen to the word spoken on your tape-recorder, then spell it out on your ZX81. 300 words in total suitable for 6-11 year olds.

## **Business/household**

### **Cassette 89: The Collector's Pack (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Program** - Collector's Pack, plus blank tape for up to 2 for programme storage  
**Description** - This comprehensive programme includes: collecting software, (date etc.) to hold up to 400 records of up to 8 different items on one cassette. Keep your records up to date and sorted into order.

### **Cassette 90: The Club Record Controller (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £3.95

**Program** - Club Record Controller plus blank tape or use 2 for programme storage  
**Description** - Enables clubs to keep records of up to 100 members and one cassette. Works for names, addresses, phone numbers plus the type of extracurricular information - eg type of membership.

### **Cassette 91: M3-CALC (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £1.95

### **Program - M3-CALC**

**Description** - Turns your ZX81 into an amazingly powerful calculator. M3-CALC computes, generates and calculates long tables for applications such as financial analysis, output sheets, and projections. Complete with full instructions.

### **Cassette 94: M3-FILE (PCL)**

Hardware required - ZX81 + 16K RAM  
Price - £1.95

### **Programs - M3-FILE (Examples)**

**Description** - A general-purpose information storage and retrieval program with emphasis on user friendliness and visual display. Use it to catalogue your collection, maintain records of club memberships, keep track of your accounts, or act as telephone directory.

## **How to order**

Simply use the FREEPOST order form (also available enclosed) or cheque or give us your credit card number. Credit card holders can order by phone - simply call Camberley 337195 90194 or 337000 during office hours (after 5pm, orders show up to 28 days for delivery, and there's a 14-day money-back option, of course).

# **sinclair**

# **ZX81**

# **SOFTWARE**

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01	See Page 9	09	00.00	
01	See Page 10	10	00.00	
01	See Page 11	11	00.00	
01	See Page 12	12	00.00	
01	See Page 13	13	00.00	
01	See Page 14	14	00.00	
01	See Page 15	15	00.00	
01	See Page 16	16	00.00	
01	See Page 17	17	00.00	
01	See Page 18	18	00.00	
01	See Page 19	19	00.00	
01	See Page 20	20	00.00	
01	See Page 21	21	00.00	
01	See Page 22	22	00.00	
01	See Page 23	23	00.00	
01	See Page 24	24	00.00	
01	See Page 25	25	00.00	
01	See Page 26	26	00.00	
01	See Page 27	27	00.00	
01	See Page 28	28	00.00	
01	See Page 29	29	00.00	
01	See Page 30	30	00.00	
01	See Page 31	31	00.00	
01	See Page 32	32	00.00	
01	See Page 33	33	00.00	
01	See Page 34	34	00.00	
01	See Page 35	35	00.00	
01	See Page 36	36	00.00	
01	See Page 37	37	00.00	
01	See Page 38	38	00.00	
01	See Page 39	39	00.00	
01	See Page 40	40	00.00	
01	See Page 41	41	00.00	
01	See Page 42	42	00.00	
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01	See Page 44	44	00.00	
01	See Page 45	45	00.00	
01	See Page 46	46	00.00	
01	See Page 47	47	00.00	
01	See Page 48	48	00.00	
01	See Page 49	49	00.00	
01	See Page 50	50	00.00	
01	See Page 51	51	00.00	
01	See Page 52	52	00.00	
01	See Page 53	53	00.00	
01	See Page 54	54	00.00	
01	See Page 55	55	00.00	
01	See Page 56	56	00.00	
01	See Page 57	57	00.00	
01	See Page 58	58	00.00	
01	See Page 59	59	00.00	
01	See Page 60	60	00.00	
01	See Page 61	61	00.00	
01	See Page 62	62	00.00	
01	See Page 63	63	00.00	
01	See Page 64	64	00.00	
01	See Page 65	65	00.00	
01	See Page 66	66	00.00	
01	See Page 67	67	00.00	
01	See Page 68	68	00.00	
01	See Page 69	69	00.00	
01	See Page 70	70	00.00	
01	See Page 71	71	00.00	
01	See Page 72	72	00.00	
01	See Page 73	73	00.00	
01	See Page 74	74	00.00	
01	See Page 75	75	00.00	
01	See Page 76	76	00.00	
01	See Page 77	77	00.00	
01	See Page 78	78	00.00	
01	See Page 79	79	00.00	
01	See Page 80	80	00.00	
01	See Page 81	81	00.00	
01	See Page 82	82	00.00	
01	See Page 83	83	00.00	
01	See Page 84	84	00.00	
01	See Page 85	85	00.00	
01	See Page 86	86	00.00	
01	See Page 87	87	00.00	
01	See Page 88	88	00.00	
01	See Page 89	89	00.00	
01	See Page 90	90	00.00	
01	See Page 91	91	00.00	
01	See Page 92	92	00.00	
01	See Page 93	93	00.00	
01	See Page 94	94	00.00	
01	See Page 95	95	00.00	
01	See Page 96	96	00.00	
01	See Page 97	97	00.00	
01	See Page 98	98	00.00	
01	See Page 99	99	00.00	
01	See Page 100	100	00.00	

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01	See Page 101	101	00.00	
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01	See Page 104	104	00.00	
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01	See Page 106	106	00.00	
01	See Page 107	107	00.00	
01	See Page 108	108	00.00	
01	See Page 109	109	00.00	
01	See Page 110	110	00.00	
01	See Page 111	111	00.00	
01	See Page 112	112	00.00	
01	See Page 113	113	00.00	
01	See Page 114	114	00.00	
01	See Page 115	115	00.00	
01	See Page 116	116	00.00	
01	See Page 117	117	00.00	
01	See Page 118	118	00.00	
01	See Page 119	119	00.00	
01	See Page 120	120	00.00	
01	See Page 121	121	00.00	
01	See Page 122	122	00.00	
01	See Page 123	123	00.00	
01	See Page 124	124	00.00	
01	See Page 125	125	00.00	
01	See Page 126	126	00.00	
01	See Page 127	127	00.00	
01	See Page 128	128	00.00	
01	See Page 129	129	00.00	
01	See Page 130	130	00.00	
01	See Page 131	131	00.00	
01	See Page 132	132	00.00	
01	See Page 133	133	00.00	
01	See Page 134	134	00.00	
01	See Page 135	135	00.00	
01	See Page 136	136	00.00	
01	See Page 137	137	00.00	
01	See Page 138	138	00.00	
01	See Page 139	139	00.00	
01	See Page 140	140	00.00	
01	See Page 141	141	00.00	
01	See Page 142	142	00.00	
01	See Page 143	143	00.00	
01	See Page 144	144	00.00	
01	See Page 145	145	00.00	
01	See Page 146	146	00.00	
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01	See Page 149	149	00.00	
01	See Page 150	150	00.00	

PAGE 2

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PAGE 3

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